

**B.Tech. MECHANICAL ENGINEERING
(BTMEVI)**

Term-End Examination

June, 2014

BIME-017 : POWER PLANT ENGINEERING

Time : 3 hours

Maximum Marks : 70

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- Note :**
- (i) *Answer any five questions.*
 - (ii) *All questions carry equal marks.*
 - (iii) *Use of calculator is permitted.*
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1. (a) Define primary and secondary energy sources with the help of a block diagram, explain the layout of a thermal power plant.
- (b) Explain the terms base load and peak load of a power plant. A coal based plant of capacity 200 MW operates at 80% PLF and consumes coal at the rate of 135 T/hour. Calculate specific fuel consumption of the plant per day. **2x7=14**

2. (a) What are the advantages and disadvantages of boiling water reactor over pressurized heavy water reactor ? Explain the construction and working of boiling water reactor used in a nuclear power plant. **2x7=14**
- (b) Explain how waste disposal is carried out in a nuclear power plant.

3. (a) Discuss relative advantages and disadvantages of closed cycle and open cycle gas turbine plants. 2x7=14
- (b) Air enters the compressor of a gas turbine plant operating on Brayton cycle at 101.325 k Pa and 27°C. The pressure ratio of the cycle is 6.0. Calculate maximum temperature in the cycle and the cycle efficiency.
Assume $W_T = 2.5 W_C$, where W_T and W_C are turbine and compressor respectively.
Take $r = 1.4$
4. (a) Discuss the main guiding principles in choosing a particular type of steam boiler in a thermal power plant. 2x7=14
- (b) With the help of a neat sketch, describe the working of one of the following boilers.
(i) La Mont boiler (ii) Benson boiler
5. (a) How hydraulic turbines are classified ? Define and explain specific speed of a turbine. Derive an expression for the same.
- (b) Describe briefly the function of main components of Pelton turbine used in hydro power plants. 2x7=14
6. (a) What are the advantages and disadvantages of diesel engine power plants over coal based thermal power plants ? Explain how fuel supply is regulated in a diesel engine power plant. 2x7=14
- (b) Name the harmful emissions which are emitted in a diesel engine power plant. Discuss the mechanism of formation of any *two* of these harmful gases.

7. (a) Why condensers are used in thermal power plants ? Discuss the merits and demerits of surface condensers and jet condensers. $2 \times 7 = 14$
- (b) Explain hazardous pollutants of a coal based thermal power plant. How they are controlled ?
8. Write short notes on **any two** of the followings : $2 \times 7 = 14$
- (a) Water treatment in thermal power plant
- (b) Minor and Major losses in hydro power plant
- (c) Draft tubes used in reaction turbines
- (d) Cooling towers
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